

# A Study of Kindergarten Children in Three Socioeconomic Areas of British Columbia

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PRESCHOOL YEARS are considered a crucial phase in growth and development. At the same time, they are the years in which the child is least protected from the effects of adverse living circumstances. The growing concern for the social, psychological, nutritional, and medical impact of poverty upon health has been reflected in the writings of various authors and commissions in Canada and elsewhere (1-18). The preschool years and the vulnerability of the preschool child in our society has become the object of renewed interest and concern.

We believed that a survey of children entering kindergarten in a variety of socioeconomic areas would provide a measure of the health status of British Columbia children at the conclusion of their preschool years. Such a survey would also provide some indication of the impact of differing socioeconomic circumstances upon health. We report the results of a survey of social, economic, and health variables in kindergarten-aged children

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and their families in British Columbia and differences in health status between children from three socioeconomic areas.

## Methodology

*Study areas.* The study areas were selected to provide a predominance of either low or middle income families in the sample drawn from each area. Upper income areas were not used for technical reasons; sampling in these areas was difficult because a high proportion of the children were in private schools and out of town in the summer months. Indian families were included because they represented the lowest end of the socioeconomic scale in British Columbia. Definitions used in this study appear on the next page.

For the middle income area, Fraserview-Killarney in the southeastern sector of Vancouver—largely residential—was selected. The population (35,000) consists of families with a variety of ethnic and socioeconomic backgrounds living in single-family dwellings. It is predominantly a middle class area located in the middle position of the socioeconomic rating scale for the city of Vancouver (19).

Grandview-Woodland Park, a low income inner city area in the northeastern sector of Vancouver, is a mixture of residential, commercial, and industrial zones. The population (40,000) is dominated by senior citizens and families from many ethnic and socioeconomic backgrounds liv-

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## Definitions

*Early registrant.* A child placed by his parents on the class lists for kindergarten before the end of the preceding academic year.

*Late registrant.* A child actually attending kindergarten but not placed on the class lists for kindergarten before the end of the preceding academic year.

*Indian.* A child registered on the band council list and living on the reserve.

*Income margin.* Total monthly income minus the cost of housing and regular monthly expenses, excluding food.

*Fixed expenses.* The cost of utilities (hydro, gas, oil, telephone, and water) plus other fixed regular monthly expenses (payments or other debts), but not including cost of food or clothing.

*Rent.* Cost of domicile in which the child and the majority of the family reside. This includes mortgage and loan payments on a house, but does not include payments on other property or expenses the wage earner is compensated for while living away from home.

*Family unit.* The total of the unit values for each member of the family residing in the main residence or being supported at another place of residence by the same family. Adults and children over 12 years old were assigned a unit value of 50 each. Children 12 years of age and under were assigned a unit value of 25 each.

*Total family income.* Annual family income from all sources—welfare payments, family allowance, rentals, income from boarders—that accrues to the family in the normal taxation year.

*Poor.* A child from a family that had a living scale of less than 1.7, an occupational class of 5–7, and who thought that their income was not enough or just enough to live on.

*Occupational class.* The method of social stratification devised by Blisshen in 1958 was used (21). In this system, income and years of education are used to rank a list of occupations.

*Living scale.*

[Total family income (12 months) — (rent + fixed expenses)] ÷ family unit.

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ing in boarding houses, apartments, or single-family dwellings. There is considerable population movement within the area and from this area to other urban areas within the Lower Mainland of British Columbia. Many immigrants of multiethnic origins settle here. The area has the second lowest socioeconomic rating for Vancouver (19).

The Cowichan Band lives on a rural residential reserve adjacent to Duncan on Vancouver Island. It is the largest Indian band in British Columbia (1,450 members), and it was selected for study because of its accessibility, the size of its preschool population, and the support of the Band's council for the study (20). Band members living on the reserve are housed in single- and multiple-family dwellings.

*Study design.* Derivation of the study sample is indicated in table 1. To be eligible for this study, children had to be born in 1964, entering kindergarten for the first time, and living within specific census tracts. Children registered for or attending kindergarten in Vancouver were selected from the class lists by a simple random number technique. A large late registrant group in the lower income area necessitated the establish-

ment of a third Vancouver study group. All children attending kindergarten in the Indian study area were selected for study.

The study team consisted of three interviewers and two examiners, assisted by a public health nurse and supervised by the study pediatrician (Tonkin). Fieldwork was conducted from a suitable location in each study area. Examining and interviewing rooms were available, and a play area was supervised by indigenous help.

All children and parents were seen and briefly interviewed by the pediatrician and the public health nurse. Physical and psychological examinations were given by two specially trained medical students. Interpreters were recruited from the study area and used to interview parents whenever English was not adequately understood.

Vancouver children surveyed during the summer months before the start of kindergarten received the full study unit described in the following sections. The Indian children were surveyed in the fall and winter months, but they attended kindergarten sporadically. The time interval between the examination of the early and the late registrants was too great to justify giving

the late group the medical, dental, and psychological examinations. Seasonal differences increased the likelihood of their average age being 6–8 months greater, and the effect of considerable school experience would most likely introduce major biases into the data. Therefore this group received only the parent interview portion of the survey.

The study was pretested in a nonstudy area on families known to the study pediatrician. Each study unit consisted of three parts—a physical and psychological examination, a parent interview, and a set of anthropometric and laboratory measurements. Only children who were accompanied by parents were examined and accepted for the study. An average of 45 minutes was used for the study unit.

Physical examination included routine medical and dental examinations and screening of vision and hearing. A dental score was obtained by combining scores for tooth disease (caries, abscesses, or destruction), gingival disease, and occlusive disease. A special battery of psychological tests were developed in collaboration with the Vancouver School Board and are referred to as “kindergarten readiness tests” (available from the authors upon request). During the physical examination, the parent was asked to enter another room for an interview. The ease of this separation and the child’s overall health status were each judged by the examining student on the basis of a 5-point scale (available from the authors upon request). In addition, a total readiness score was obtained by combining the separation score, the draw-a-man score, the letter-your-name score, and the kindergarten readiness test score.

The parent interview included completion of a questionnaire which dealt with the health of the

child, including history of chronic disease and acute illnesses in the preceding 2 weeks. A modified version of the World Health Organization’s study questionnaire (21) was used to gather data on the family’s use of health care facilities, whether or not they had prepaid medical insurance, and their attitudes toward health care. Information was also obtained on certain social parameters, including birthplace of the child, country of origin of the parents, duration of residence in the study area, educational background and occupation of the parents, and the family’s social and religious affiliations. The questionnaire was modified, in consultation with the Cowichan Band Council, to include additional items which the band deemed relevant. Information was also obtained on total family income, cost of living, attitudes toward family income, and cash reserve.

Anthropometric measurements on each child included height, weight, triceps skinfold thickness, and arm circumference (22). The laboratory measurements included routine urinalysis, with microscopic examination if proteinuria was found, and a tine test.

At the conclusion of the kindergarten year the majority of the children in the Vancouver sample were given the Metropolitan Readiness Test by their classroom teachers (23). The teachers were also asked to report the school attendance record for each child and to record their assessment of each child in terms of the child’s status in five developmental areas and the optimum educational setting for each child in the coming year.

Information recorded in the study questionnaire was coded and transferred to computer tape. Each item was examined in simple descriptive terms (that is, frequency of each type of response) and for the statistical significance of differences between study groups. Each item was

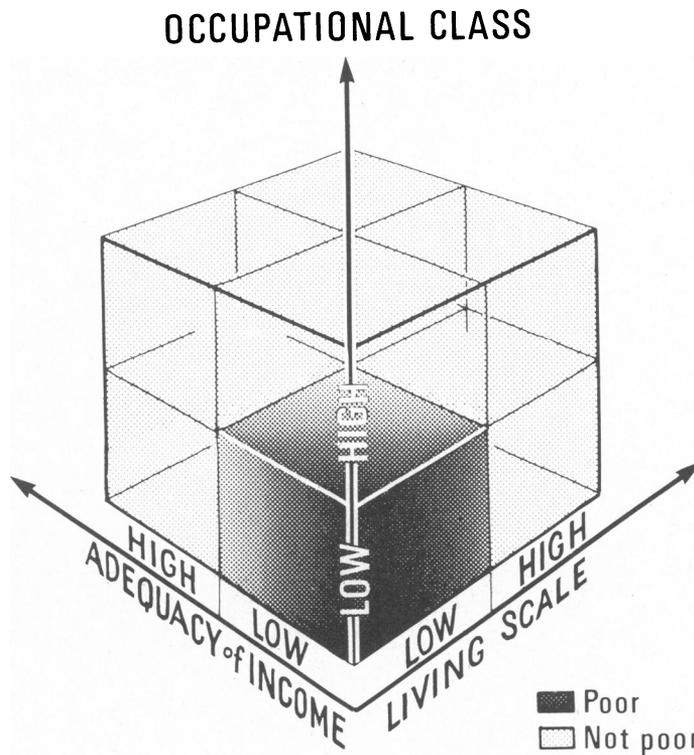
**Table 1. Derivation of study groups, Vancouver, British Columbia**

Study area	Study group	Kinder- garten population	Sample size	Respondents		Followup assessment <sup>1</sup>
				Number	Percent	
Fraserview-Killarney . . . . .	Middle income. . . . .	323	120	94	78.3	85
Grandview-Woodland. . . . .	Low income, early registrants.	452	120	95	79.2	75
Grandview-Woodland. . . . .	Low income, late registrants.	211	120	<sup>2</sup> 69	57.5	45
Cowichan. . . . .	Indian. . . . .	31	31	21	67.7	0
Total. . . . .		1,017	391	279	71.4	205

<sup>1</sup> Children receiving Metropolitan Readiness Test.

<sup>2</sup> Late registrants received only the parent interview.

**Figure 1. Schematic representation of variables determining poor versus nonpoor families**



also analyzed in terms of differences between a variety of subsets based on such variables as study area, time of registration for kindergarten, and income margin. Chi-square, Kolmogorov-Smirnov, and Student *t* tests were used as tests of significance.

To facilitate analysis of the data, some arbitrary approaches were used. For example, each family member was assigned an arbitrary dollar value that could facilitate equating family size with income. This unit was then applied uniformly to all family members in each study family and the total units per family calculated.

Optimal determinants were identified to enable a classification of the study families as poor or nonpoor. Three attributes—living scale, attitude toward adequacy of income, and occupational class—were chosen to show the most frequent and clear-cut association with the poverty state. The family's position regarding each of these attributes could be expressed on a scale for each. A position was selected on each scale which, when intercepting with positions on the other two scales, would provide a single point upon which to dichotomize into poor and nonpoor groups

(fig. 1). Comparison was then made of the various health, social, economic, and attitudinal characteristics of the two groups.

## Results

*Response rate.* The population and sample size and response rates are indicated for each of the study areas in table 1. A total of 279 children were studied, and of these, 210 children and their families received a complete interview and examination. Sixty-nine families who registered their children late received only the parent interview. The Metropolitan Readiness Test and the teacher evaluation were given to 205 children at the end of the kindergarten academic year.

*Characteristics of study families.* The families of early registrants were essentially similar for most variables and were distinctly different from late registrant and Indian families (table 2).

In the middle income area, in almost all of the families, both parents and all of the children were living at home. Almost half of the study children had lived at their present address during their entire life, and in three-quarters of their families,

the mothers had not worked during this period. Canadian-born Protestant parents with higher educational and occupational standings predominated in the area. Families in this community received the highest take-home pay, had the best average income margin, and 8 of 10 owned the home they were living in.

In the low income area the families were divisible into two populations based on their behavior regarding registration of their children for kindergarten.

Early registrants, in most respects, were indistinguishable from families in the middle income area. Differences included lower rates of home ownership and a higher percentage of working mothers. Canadian-born Protestant parents were in the minority.

Late registrants were markedly different from other families in the Vancouver areas. The important differences were shorter durations of residence and lower rates of home ownership. There were more Canadian-born and Roman Catholic parents in this group than in the early registrant group from the same study area. One in five families was a single-parent family and almost as many families had one or more children living away from home. There were more working mothers and lower educational and occupational

levels of the parents in these families than in the other groups. Families in this group had the lowest average total income and income margin of the three Vancouver groups.

In the Indian area the response rate was low, and one area on the reserve was not represented. The duration of residence and the country of origin of both parents in this group of families were the most stable of all the study families. In the majority of families, the mother was not working. Also, most families owned their homes. While slightly more of the Indian families than the late registrant families had both parents living at home, most had at least one child living outside the home. Almost all members of this band were Canadian-born and Roman Catholic. The Indian mothers and fathers had the lowest educational and occupational levels, as well as the lowest average total income and income margin of all the study areas. The income margin was similar to that of the late registrants and significantly less than that of the middle and low income, early registration study groups.

*Characteristics of study children.* The percentages of children judged normal by physical examinations, according to each measure of the examination, are shown in table 3.

The physical examinations revealed that severe

**Table 2. Percentage distribution of characteristics of study families and mean family socioeconomic status of study children, Vancouver, B.C.**

Characteristic	Middle income	Low income, early registrant	Low income, late registrant	Indian
Family characteristics				
Duration of residence:				
Less than 1 year.....	12	16	42	14
5 years or more.....	47	44	25	62
Parents married.....	96	93	78	67
Living at home:				
Both parents.....	96	93	80	86
All children.....	87	91	82	38
Religion of mother:				
Roman Catholic.....	26	44	51	91
Protestant.....	61	27	20	0
Canadian born:				
Mother.....	72	37	45	95
Father.....	68	28	42	100
Socioeconomic status				
Education, 9th grade or above:				
Mother.....	92	52	48	24
Father.....	84	58	59	33
Mother not working.....	69	47	44	76
Occupational class 1 or 2, head of household.....	21	11	10	0
Homeowner.....	83	70	44	67
Mean dollar value:				
Total income.....	\$617	\$546	\$443	\$346
Income margin.....	\$447	\$424	\$280	\$258

**Table 3. Percentage of study children judged normal by physical examinations, by study group, Vancouver, B.C.**

Measure	Middle income	Low income, early registrant <sup>1</sup>	Indian
Ears.....	96	98	86
Skin.....	94	92	43
Nodes.....	73	74	48
Tonsils.....	<sup>2</sup> 89	<sup>3</sup> 90	<sup>4</sup> 90
Chest.....	87	94	95
Hearing.....	95	91	84
Vision.....	92	93	90
Health status.....	33	16	0
Height (cms).....	109.7	107.1	111.2
Weight (kgs).....	19.0	19.0	20.5
Arm circumference (cms).....	17.9	17.6	18.0
Triceps skinfold (mm).....	9.8	9.7	8.3
Dental score (maximum=40).....	33.8	30.6	15.7

<sup>1</sup> Late registrants were not given the physical examination.

<sup>2</sup> Tonsils removed in 17 children.

<sup>3</sup> Tonsils removed in 11 children.

<sup>4</sup> Tonsils removed in 24 children.

dental disease was the predominant health finding, and it was most marked among Indian children. Children in the middle income study group showed the best overall dental health. Skin, lymph node, and middle ear disorders were also more prevalent and more severe among Indian children. All three groups had a similar percentage of tonsils or tonsillar fossae reported as "normal." A greater percentage of the Indian children had had a tonsillectomy by the time they entered kindergarten. The cardiorespiratory findings reported were similar in each group and almost entirely consisted of "functional murmurs."

Examination of height, weight, and skinfold thickness revealed greater weight and smaller skinfold thickness in the Indian children. There were insufficient numbers of positive results from the urinalysis and the tine tests to warrant analysis.

Psychological assessments are shown in table 4. Children from the low income area had greater

difficulty with separation from their parents and "letter your name." The Indian children were less threatened by the separation from their parents and less facile with the "draw a man" item. These differences, largely attributable to cultural differences and technical factors in the test setting, seemed to compensate for each other with the net result that total readiness scores were similar for all three study groups. All children entered kindergarten at a reasonably equal level but not all progressed at the same rate.

School attendance and performance by the Vancouver children are shown in table 5. Children from the middle income group were less frequently absent from school, and the late registrant children showed the highest absenteeism rates. The followup examination of the Vancouver children revealed persistence of some of the differences on the subtest items noted in the kindergarten readiness tests. These differences between children from the middle and lower income

**Table 4. Psychological assessments of study children, Vancouver, B.C.<sup>1</sup>**

Study group	Draw a man (maximum=10)	Letter your name (maximum=10)	Ease of separation from parent (maximum=10)	Total readiness <sup>2</sup> (maximum=75)
Middle income.....	4.9	4.8	9.2	47.8
Low income, early registrant.....	4.9	3.4	7.8	46.8
Indian.....	4.1	4.6	9.7	46.8

<sup>1</sup> Late registrant children did not receive the psychological assessment.

<sup>2</sup> Includes kindergarten readiness subtests weighted for age.

**Table 5. School attendance and performance of study children, in percentages, Vancouver, B.C.**

Study group	Absent 5 percent of school days	Recommended grade 1 placement <sup>1</sup>		Mean scores on performance tests	
		Regular or enriched	Extra help or special	Metropolitan Readiness Test (maximum = 102)	Draw a man (maximum = 10)
Middle income.....	54	81	19	56.0	6.0
Low income, early registrant.....	25	78	22	52.1	6.6
Low income, late registrant.....	8	66	34	43.7	5.8

<sup>1</sup> Teacher evaluation.

NOTE: None of the Indian children received Metropolitan Readiness Test or teacher evaluation. Indian children studied missed 37 percent of the total kindergarten days.

**Table 6. Health care practices of study families, in percentages, Vancouver, B.C.**

Study group	Family physician	Medical insurance	Child has seen dentist	Child has toothbrush
Middle income.....	87	99	60	100
Low income, early registrant.....	90	97	25	95
Low income, late registrant.....	91	98	53	96
Indian.....	81	100	45	38

groups were corroborated in the teachers' assessment of the study children's development. Fewer children in the late registration group were ready for a regular or enriched grade 1 experience, according to their teachers.

Table 6 shows the health care practices of the study families. Most families in all three areas could name a private family physician. All families had some form of recognized prepaid medical insurance that provided private physician services at no extra cost. Many were confused about the amount of their premiums or the names of their licensed carrier. Only 45 percent of the Indian children had ever visited a dentist, and less than 40 percent owned or used a toothbrush. Only 25 percent of the children in the low income early registration study group had visited a dentist.

Significant differences between poor and non-poor families were noted in the ability to meet unexpected expenses in excess of \$200, in the proportion of families with children living away from home, and in the degree of unemployment among the heads of households (table 7). Significantly more of the poor mothers were born in Canada, and fewer were Protestant. Poor families were less likely to own a car.

The health status of children from poor families was judged to be abnormal more frequently than from nonpoor families, but this difference was not statistically significant (table 7). Poor

children showed significantly more skin infections and more difficulties with bed-wetting than non-poor children. Comparison of dental scores for the children from poor families shows a much lower level of dental health in these children (fig. 2).

## Discussion

Vancouver's inner city area is not characterized by the large number of run-down, overcrowded slum dwellings of other major urban centers. This

**Table 7. Characteristics of poor versus nonpoor children and families, in percentages, Vancouver, B.C.**

Characteristic	Poor	Non-poor	Significance of X <sup>2</sup>
Children with—			
Health status normal .....	10.0	25.5	( <sup>1</sup> )
Skin normal .....	72.2	91.5	P<.01
Bed-wetting problem .....	43.1	26.4	P<.05
Families with—			
All children at home .....	64.9	88.7	P<.001
Mother Canada born .....	69.0	51.3	P<.05
Mother Protestant .....	22.4	40.1	P<.05
Head of household employed 6 months or more .....	67.2	95.4	P<.001
Able to pay \$200 expense .....	55.4	85.8	P<.001
Own car .....	56.9	78.7	P<.01

<sup>1</sup> Not significant.

lack of a large typical inner-city ghetto is reflected in the findings of this study. The data show that a remarkably high percentage of the families in the inner-city area live in single family dwellings that they own. The resultant search for low rental housing has dispersed the low socioeconomic status family throughout the metropolitan area and is a major factor in our failure to isolate a substantial population of poor and disadvantaged children.

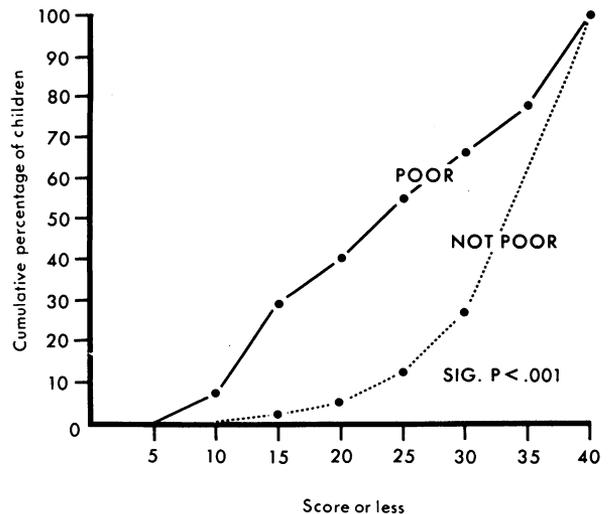
The paucity of positive findings in the various health parameters studied raises the question of the value of routine performance of many standard examinations in the kindergarten age group if adequate health care is available and accessible during the preschool period. No previously unidentified conditions were found during the study. A simple examination of the teeth and gums, the skin, and possibly the ears seemed to suffice as a health maintenance examination in this age group. Such an examination, important for health maintenance surveys, could be adequately performed by specially prepared public health nurses or nurse practitioners working in the community. The presence of skin infections and poor dental health could be considered an indication of families at risk for poverty.

Only a few health measures related reasonably clearly to the socioeconomic status of the study families—skinfold thickness, dental health, and infections of the skin, lymph nodes, and middle ears. Furthermore, poor school performance seemed to be a liability of low socioeconomic status. Dental health was a universal problem in the study children; but curiously enough, the low income early registrant children had the poorest record of visits to a dentist. This may reflect a different set of health perceptions that are culturally determined or a lower priority for dental expenditures in the family budget.

In examining the relationship between socioeconomic conditions of the family during the preschool period and the health of the study children, we found that most of the children were healthy and had reasonable socioeconomic living conditions. With the exception of the late registrant and the Indian child, there was little medical or psychological evidence to support the contention that preschool children in British Columbia are being adversely affected by their living circumstance.

We believe that late-registering families are

**Figure 2. Dental scores of children from poor families versus nonpoor families**



highly mobile, are often searching for adequate low-cost housing, are under considerable financial strain, and often represent families in trouble. If this is so, our present methods of casefinding may need reassessment, because these families are not being identified until long after they register their children at school. In addition, our Head Start projects are geared to this type of family, yet they seem more likely to reach the early registrant group. This early registrant group, if it is disadvantaged, requires language and socialization programs and dental education delivered in a middle class model rather than the traditional Head Start methods.

In British Columbia, the native Indian seems to represent the extreme end of the Canadian poverty scale. The quantitative and qualitative differences between Indian families and non-Indian families studied were readily apparent to the study team. It should also be acknowledged that only those children who survived 5 years were

used in the study sample. Most of the Indian families in the study had experienced the loss of at least one child or had one or more children in foster care. This finding, when compared with the relative infrequency of this experience in non-Indian families, only serves to accentuate the tragic finding that the children in this small group of families had the greatest percentage of health deficiencies among the study children.

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**TONKIN, ROGER S. (University of British Columbia), ROBINSON, GEOFFREY C., and KINNIS, CLAIRE: A study of kindergarten children in three socioeconomic areas of British Columbia. *Health Services Reports, Vol. 88, December 1973, pp. 947-955.***

In a survey of 279 kindergarten children and their families in three socioeconomic areas of British Columbia, a wide variety of health, social, and economic variables were examined. The study methods included physical and psychological examinations and a set of anthropometric and laboratory measurements of the

children and interviews with the parents.

The families of early registrants showed distinct differences from the families of late registrants and Indians. A child who is registered late for school, or who is an Indian, has a greater chance of coming from a family

that is suffering social and economic hardship. This child will likely reflect that hardship by having more severe dental disease, more frequent infections of his skin, tonsils, and ears, and a poorer record of attendance and performance at school than his counterpart in the rest of British Columbia.